

IN THE CLAIMS

1- 65. (Cancelled)

66. (Currently Amended) An apparatus for aerobically composting waste material in an aerated ~~exothermic~~ composting process, the apparatus comprising:

an enclosed vessel comprising a first end wall, a second, opposing end wall and side wall(s) defining an interior vessel space;

a rotatable shaft located within said vessel space;

a drive means operatively connected to said rotatable shaft for driving said shaft:

size reduction means for reducing the size of waste material introduced to the vessel;
wherein said size reduction means divides the interior vessel space into first and second regions and defines a zone of size reduction through which waste material must pass as it passes through the vessel;

said size reduction means comprising one or more cantilevered bars, blades or cutting plates rigidly mounted on said rotatable shaft and rotatable with said shaft, and one or more fixed bars, blades or cutting plates mounted on and extending from said side wall(s), wherein said rotatable and fixed bars, blades or cutting plates overlap and co-operate together to create a shearing action so as to reduce the size of the waste material as said waste material passes through said size reduction means;

a loading port through which waste material may be introduced to said first region of the vessel;

a discharge port through which waste material may be removed from the second region of the vessel; and

a source of oxygen for maintaining conditions within said vessel suitable for the aerobic composting of said waste material;

wherein, when the apparatus is in use, waste material introduced to said vessel moves from said first region through the size reduction means to said second region.

67. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein said vessel is constructed of, or lined with, stainless steel or alternative corrosion-resistant material.

68. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein said side wall(s) and/or said end walls are insulated so as to retain heat generated by aerobic composting of introduced waste material.
69. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein said internal vessel space is of an internal volume of less than 8m^3 .
70. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 69 wherein said internal volume of said internal vessel space is within the range of 1.5m^3 to 5.0m^3
71. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 70 wherein said internal volume of said internal vessel space is within the range of 2.0m^3 to 3.0m^3 .
72. (Cancelled)
73. (Currently Amended) An apparatus for aerobically composting waste material as claimed in claim 66, wherein at least one of the rotatable bars, blades or cutting plates rotates for a portion of its rotation directly past and adjacent to said fixed bars, blades or cutting plates.
74. (Currently Amended) An apparatus for aerobically composting waste material as claimed in claim 73, wherein at least one of the rotatable bars, blades or cutting plates rotates for a portion of its rotation within a parallel space between two of said fixed bars, blades or cutting plates.
75. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 73 wherein one or more of said fixed and moving bars, blades or cutting plates include a plurality of teeth.
76. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 74 wherein said parallel space between said two of said fixed bars, blades or cutting plates is less than 200 mm in width.

77. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 76 wherein said parallel space between said two of said fixed bars, blades or cutting plates is less than 100 mm in width.
78. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 74 wherein said rotatable and fixed bars, blades or cutting plates are of substantially similar widths.
79. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 74 wherein said width of the rotatable and fixed bars or blades is within the range of 30 to 200 mm.
80. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein said loading port is located in the side wall(s) adjacent to the upper end wall.
81. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein said loading port is located in the upper end wall.
82. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein said discharge port is located in the side wall(s) adjacent to the lower end wall.
83. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein said discharge port is located in the lower end wall.
84. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein one end of said rotatable shaft is mounted on or near one end wall, and the opposing end of said rotatable shaft is mounted on or near the opposing end wall.
85. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein said rotatable shaft is located centrally within the vessel.
86. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein said rotatable shaft rotates at a speed of less than 60 rpm.

87. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 86 wherein said rotatable shaft rotates at a speed in the range of 10 to 30 rpm.
88. (Currently Amended) An apparatus for aerobically composting waste material as claimed in claim 66 wherein said drive means comprises a single ~~electric~~ motor.
89. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein one or more agitation bar(s) are mounted on said rotatable shaft for promoting even and consistent flow of materials through the vessel.
90. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein one or more distribution bars are mounted on said rotatable shaft in the region of the loading port for assisting in loading materials into the vessel and feeding said waste material into said zone of size reduction.
91. (Cancelled)
92. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein one or more sweeper bars or discharge plates are mounted on said rotatable shaft to promote composted material towards and out of the discharge port.
93. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein free ends of said one or more rotatable bars, blades or cutting plates are shaped so as to draw material away from said side wall(s) of the vessel.
94. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein said rotatable shaft is capable of rotation both in a clockwise and anti-clockwise direction, and one or more rotating bars, blades or cutting plates, agitation bars or discharge sweeper bar/plate(s) are shaped symmetrically or otherwise asymmetrically shaped so as to draw material away from said side wall(s) of the vessel whilst rotating in either direction to allow for effective action in both directions.
95. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein said discharge port can be closed with a hatch or cover to form a watertight and airtight seal.

96. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein said loading port can be closed with a hatch or cover to form a watertight and airtight seal.
97. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein said source of oxygen is controlled so as to provide sufficient oxygen to maintain the temperature and oxygen conditions within the vessel space for composting by aerobic mesophilic and thermophilic microorganisms.
98. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 further comprising one or more temperature sensor(s) within the vessel for monitoring temperature and controlling the supply of oxygen to the vessel space.
99. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein said source of oxygen is in the form of compressed air.
100. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 99 wherein if the temperature, as measured by temperature sensor, drops to below a first set temperature, said source of oxygen is activated in a manner that supports increased biological activity and consequently causes an increase in temperature; and if the temperature, as measured by temperature sensor, increases to above a second set temperature said source of oxygen is activated to blow off excess heat, thereby maintaining temperatures within the desired range.
101. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 100 wherein said temperature sensor is located in the lower region of the vessel in a position within 250 - 450 mm of the lower end wall.
102. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein supplied oxygen enters the vessel by one or more inlets located in the side wall(s) relatively adjacent to the join with the lower end wall.

103. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein supplied oxygen enters the vessel by one or more inlets located in the lower end wall and/or located centrally in a basal bearing of the said rotatable shaft.

104. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein the apparatus is provided with at least one process air outlet located in or adjacent to the top of the vessel, to discharge gas or process air from within the vessel.

105. (Previously Presented) An apparatus for aerobically composting waste material as claimed in claim 66 wherein discharge gas or process air from within the vessel is fed to a biofiltration or odour treatment unit to treat said air prior to release to atmosphere.

106. (Withdrawn) An apparatus for aerobically composting waste material, the apparatus comprising:

- a generally vertically-orientated vessel comprising an upper end wall, a lower end wall and side wall(s) defining an interior vessel space;

- a generally vertically extending rotatable shaft located within said vessel space;

- a drive means operatively connected to said rotatable shaft for driving said shaft;

- size reduction means mounted on said rotatable shaft for reducing the size of waste material introduced to the vessel, wherein said size reduction means divides the interior vessel space into upper and lower regions and defines a zone of size reduction through which all waste material must pass as it passes through the vessel such that all size reduction and incorporation of waste materials can occur internal to the vessel;

- a loading port through which waste material may be introduced to said upper region of the vessel;

- a discharge port through which waste material may be removed from the lower region of the vessel; and

- a source of oxygen to maintain aerobic conditions within said vessel,

wherein, when the apparatus is in use, waste material introduced to said vessel gravitationally and via mechanical agitation moves from said upper region through the size reduction means to said lower region.

107. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein said vessel is constructed of, or lined with, stainless steel or alternative corrosion-resistant material.
108. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein said side wall(s) and/or said end walls are insulated so as to retain heat generated by aerobic composting of introduced waste material.
109. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein said internal vessel space is of an internal volume of less than 8m^3 .
110. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 109 wherein said internal volume of said internal vessel space is within the range of 1.5m^3 to 5.0m^3 .
111. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 110 wherein said internal volume of said internal vessel space is within the range of 2.0m^3 to 3.0m^3 .
112. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein said size reduction means comprises a plurality of bars, blades or cutting plates.
113. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 112 wherein said size reduction means comprises one or more rotatable bars, blades or cutting plates mounted on said rotatable shaft, and further comprises one or more fixed and parallel bars, blades or cutting plates mounted on said side wall(s), wherein at least one of the rotatable bars, blades or cutting plates rotates for a portion of its rotation directly past and adjacent to said fixed bars, blades or cutting plates.
114. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 113 wherein said size reduction means comprises one or more, horizontally rotatable blades or cutting plates mounted on said rotatable shaft, and further comprises two or more fixed, horizontally disposed and parallel bars, blades or cutting plates mounted on said side wall(s),

wherein at least one of the horizontally rotatable bars, blades or cutting plates rotates for a portion of its rotation within a parallel space between two of said fixed bars, blades or cutting plates.

115. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 113 wherein one or more of said fixed and moving bars, blades or cutting plates include a plurality of teeth.

116. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 114 wherein said parallel space between said two of said fixed bars, blades or cutting plates is less than 200 mm in width.

117. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 116 wherein said parallel space between said two of said fixed bars, blades or cutting plates is less than 100 mm in width.

118. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 114 wherein said rotatable and fixed bars, blades or cutting plates are of substantially similar widths.

119. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 114 wherein said width of the rotatable and fixed bars or blades is within the range of 30 to 200 mm.

120. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein said loading port is located in the side wall(s) adjacent to the upper end wall.

121. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein said loading port is located in the upper end wall.

122. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein said discharge port is located in the side wall(s) adjacent to the lower end wall.

123. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein said discharge port is located in the lower end wall.
124. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein one end of said rotatable shaft is mounted on or near one end wall, and the opposing end of said rotatable shaft is mounted on or near the opposing end wall.
125. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein said rotatable shaft is located centrally within the vessel.
126. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein said rotatable shaft rotates at a speed of less than 60 rpm.
127. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 126 wherein said rotatable shaft rotates at a speed in the range of 10 to 30 rpm.
128. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein said drive means comprises a single electric motor.
129. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein one or more agitation bar(s) are mounted on said rotatable shaft for promoting even and consistent flow of materials through the vessel.
130. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein one or more distribution bars are mounted on said rotatable shaft in the region of the loading port for assisting in loading materials into the vessel and feeding said waste material into said zone of size reduction.
131. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein said drive means comprises a single hydraulic motor.
132. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein one or more sweeper bars or discharge plates are mounted on said rotatable shaft to promote composted material towards and out of the discharge port.

133. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein free ends of said one or more rotatable bars, blades or cutting plates are shaped so as to draw material away from said side wall(s) of the vessel.
134. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein said rotatable shaft is capable of rotation both in a clockwise and anti-clockwise direction, and one or more rotating bars, blades or cutting plates, agitation bars or discharge sweeper bar/plate(s) are shaped symmetrically or otherwise asymmetrically shaped so as to draw material away from said side wall(s) of the vessel whilst rotating in either direction to allow for effective action in both directions.
135. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein said discharge port can be closed with a hatch or cover to form a watertight and airtight seal.
136. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein said loading port can be closed with a hatch or cover to form a watertight and airtight seal.
137. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein said source of oxygen is controlled so as to provide sufficient oxygen to maintain the temperature and oxygen conditions within the vessel space for composting by aerobic mesophilic and thermophilic microorganisms.
138. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 further comprising one or more temperature sensor(s) within the vessel for monitoring temperature and controlling the supply of oxygen to the vessel space.
139. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein said source of oxygen is in the form of compressed air.
140. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 139 wherein if the temperature, as measured by temperature sensor, drops to below a first set temperature, said source of oxygen is activated in a manner that supports increased biological

activity and consequently causes an increase in temperature; and

if the temperature, as measured by temperature sensor, increases to above a second set temperature said source of oxygen is activated to blow off excess heat, thereby maintaining temperatures within the desired range.

141. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 140 wherein said temperature sensor is located in the lower region of the vessel in a position within 250 - 450 mm of the lower end wall.

142. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein supplied oxygen enters the vessel by one or more inlets located in the side wall(s) relatively adjacent to the join with the lower end wall.

143. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein supplied oxygen enters the vessel by one or more inlets located in the lower end wall and/or located centrally in a basal bearing of the said rotatable shaft.

144. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein the apparatus is provided with at least one process air outlet located in or adjacent to the top of the vessel, to discharge gas or process air from within the vessel.

145. (Withdrawn) An apparatus for aerobically composting waste material as claimed in claim 106 wherein discharge gas or process air from within the vessel is fed to a biofiltration or odour treatment unit to treat said air prior to release to atmosphere.

146. (Withdrawn) A method of producing a composted product using an apparatus for aerobically composting waste material, said apparatus comprising;

a vessel comprising an upper end wall, lower end wall and side wall(s) defining an interior vessel space;

a rotatable shaft located within said vessel space;

a drive means operatively connected to said rotatable shaft for driving said shaft;

size reduction means mounted on said rotatable shaft for reducing the size of waste material introduced to the vessel, wherein said size reduction means divides the interior vessel

space into first and second regions and defines a zone of size reduction through which all waste material must pass as it passes through from input end to discharge end of the vessel;

a loading port through which waste material may be introduced to said first region of the vessel;

a discharge port through which waste material may be removed from said second region of the vessel; and

a source of oxygen to maintain aerobic conditions within said vessel,

wherein said method comprises introducing said waste material into said first region of the vessel through said loading port, passing said waste material through said size reduction means to reduce the size of the waste material, whilst maintaining conditions within said vessel suitable for aerobically composting said waste material.

147. (Withdrawn) A method of producing a composted product as claimed in claim 146 wherein said method of processing the waste material into composted product is by continuous or plug flow, whilst maintaining conditions within said vessel suitable for aerobic composting of said waste material thereby maintaining thriving biological communities required for decomposition without the requirement for accelerators or inoculants.

148. (Withdrawn) A method of producing a composted product as claimed in claim 147 wherein said waste material is added to the top of the vessel via said loading port and gradually moves through the vessel towards the discharge end under due to gravitation and mechanical agitation as composted product is removed from the vessel via said discharge port.

149. (Withdrawn) A method of producing a composted product as claimed in claim 146 wherein said waste material with high moisture content are introduced to the vessel and combined with absorbent or adsorbent material or waste material within the vessel to ensure suitable moisture or liquids content in the composting mass.

150. (Withdrawn) A method of producing a composted product as claimed in claim 149 wherein the waste material with high moisture content is pre-mixed with said adsorbent or absorbent material or waste material prior to introduction into the vessel.

151. (Withdrawn) A method of producing a composted product as claimed in claim 149 wherein said materials are introduced into the vessel in a ratio to achieve a combined moisture content of 50 to 75% (on a wet weight basis) and a carbon to nitrogen ratio of less than 40:1 (on a dry weight basis).

152. (Withdrawn) A method of producing a composted product as claimed in claim 149 wherein said materials are introduced into the vessel in a ratio to achieve a combined moisture content of 55 to 70% (on a wet weight basis) and a carbon to nitrogen ratio of between 25:1 and 20:1 (on a dry weight basis).

153. (New) An apparatus for aerobically composting waste material as claimed in claim 66 wherein said fixed bars, blades or cutting plates have first and second ends and are mounted to said side wall(s) at both said first and second ends so as to extend across said interior vessel space.

154. (New) An apparatus for aerobically composting waste material, the apparatus comprising:
an enclosed vessel comprising a first end wall, a second, opposing end wall and side wall(s) defining an interior vessel space;
a rotatable shaft located within said vessel space;
a drive means operatively connected to said rotatable shaft for driving said shaft;
one or more cantilevered bars, blades or cutting plates mounted on said rotatable shaft and rotatable with said shaft;
one or more fixed bars, blades or cutting plates having first and second ends, said one or more fixed bars, blades or cutting plates being mounted to said side wall(s) at both said first and second ends so as to extend across said interior vessel space, whereby said rotatable and fixed bars, blades or cutting plates co-operate together to reduce the size of the waste material as said waste material passes through the vessel;
a loading port through which waste material may be introduced to the vessel;
a discharge port through which waste material may be removed from the vessel; and
a source of oxygen to maintain aerobic conditions within said vessel.

155. (New) The apparatus of claim 154, wherein the rotatable shaft is mounted to the first end wall and to the second end wall.

156. (New) The apparatus of claim 154, wherein the one or more cantilevered bars, blades or cutting plates mounted on said rotatable shaft overlap with the one or more fixed bars, blades or cutting plates extending across the vessel to create a shearing action during operation.

157. (New) The apparatus of claim 66, wherein the rotatable shaft is mounted to the first end wall and to the second end wall.